PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing
(day/month/year)   11.09.2009
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Applicant's or agent's file reference P85547PC00	**IMPORTANT NOTIFICATION**

International application No. PCT/EP2007/009763	International filing date (day/month/year) 12.11.2007	Priority date (day/month/year) 26.09.2007

Applicant
Fotonation Vision Limited

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1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

   The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

   Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

   For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

   The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Authorized Officer Marra, Emanuela Tel. +49 89 2399-7235

Form PCT/IPEA/416 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P85547PC00	**FOR FURTHER ACTION**	See Form PCT/PEA/416
International application No PCT/EP2007/009763	International filing date *(day/month/year)* 12.11.2007	Priority date *(day/month/year)* 26.09.2007

International Patent Classification (IPC) or national classification and IPC
INV. G06K9/68

Applicant
Fotonation Vision Limited

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

  a. ☒ *sent to the applicant and to the International Bureau)* a total of <u>2</u> sheets, as follows:

   ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

   ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

  b ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

  ☒ Box No. I   Basis of the report
  ☐ Box No. II   Priority
  ☐ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  ☐ Box No. IV   Lack of unity of invention
  ☒ Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  ☐ Box No. VI   Certain documents cited
  ☐ Box No. VII   Certain defects in the international application
  ☐ Box No. VIII   Certain observations on the international application

Date of submission of the demand 2008-08-12	Date of completion of this report 11.09.2009
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Authorized officer Rimassa, Simone Telephone No +49 89 2399-2068

Box No. I   Basis of the report

1. With regard to the **language**, this report is based on

    ☒ the international application in the language in which it was filed

    ☐ a translation of the international application into , which is the language
    of a translation furnished for the purposes of:
      ☐ international search (under Rules 12.3(a) and 23.1(b))
      ☐ publication of the international application (under Rule 12.4(a))
      ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

    Description, Pages

    1-10   as originally filed

    Claims, Numbers

    1-11   received on 18.08.2008 with letter of 12.08.2008

    Drawings, Sheets

    1, 2   as originally filed

    ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
      ☐ the description, pages
      ☐ the claims, Nos.
      ☐ the drawings, sheets/figs
      ☐ the sequence listing *(specify)*:
      ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
      ☐ the description, pages
      ☐ the claims, Nos.
      ☐ the drawings, sheets/figs
      ☐ the sequence listing *(specify)*:
      ☐ any table(s) related to sequence listing *(specify)*:

5. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 70.2 (e)).

6. ☐ Supplementary international search report(s) from Authority(ies)   have been received and taken into account in drawing up this report (Rule 45bis.8(b) and (c)).

Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	<u>1-11</u>
	No:	Claims	
Inventive step (IS)	Yes:	Claims	<u>1-11</u>
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	<u>1-11</u>
	No:	Claims	

2. Citations and explanations (Rule 70.7):

   <u>see separate sheet</u>

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: Embedded Convolutional Face Finder
      Sébastien Roux, Frank Mamalet and Christophe Garcia

The document D1 is regarded as being the closest prior art to the subject-matter of independent claims 1 and 11, and shows an optimized Convolutional Face Finder for real-time application with limited amount of resource available. The CFF consist in a pipeline of convolutions and subsampling operations:
- a coarse detection is first performed applying the CFF on a pyramid of scaled versions of the input image in order to handle faces of different sizes, each scale produces a map of faces candidates which is fused back to the input image resolution and produce candidate clusters, for each cluster a representative face is computed (position and size);
- then a fine detection takes those candidate as input and applies locally the same CFF on a small pyramid around the face candidate positions.

The subject-matter of claims 1 and 11 differs from this known method in that define to apply a strict (high threshold) classifier for location large and medium sized faces and a more relaxed (lower threshold) classifier for detecting small faces. Then, in order to reduce the number of false positive detections of small sized faces, a strict classifier is applied to the small sized face candidates on a higher resolution version of the image.

The disclosed method enables a further optimization of the resources (hardware and software) with respect to the method known from document D1 and therefore the subject-matter of independent claims 1 and 11 is considered novel (Article 33(3) PCT) and involving an inventive step (Article 33(3) PCT).

Claims 2-10 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

Independent method claim 1 appropriately defines that the qualifications of the classifiers - *high quality* and *relaxed* - relate to their acceptance rates (higher threshold or longer cascade for the high quality classifier and lower threshold or shorter cascade for the relaxed classifier). In this way the claim makes clear that the qualifications do not relate to the intrinsic quality of the classifiers.

Independent apparatus claim 11 fails to make clear this point and it is therefore considered not completely clear and not completely consistent with the description (Art. 6 PCT).

Claims:

1.   A method operable in a digital image acquisition system having no photographic film, said method comprising:

5   a) receiving a relatively low resolution image of a scene from an image stream, said scene potentially including one or more faces;

    b) applying at least one high quality face classifier to said image to identify large and medium sized face regions, said at least one high quality face classifier comprising a long cascade classifier or a classifier with a high threshold for accepting a face;

10   c) applying at least one relaxed face classifier to said image to identify small sized face regions relative to said large and medium sized face regions, wherein said relaxed classifier comprises a short cascade classifier relative to said long cascade classifier or a classifier with a low threshold relative to said high threshold for accepting a face;

    d) receiving a relatively high resolution image of nominally the same scene;

15   e) applying at least one high quality face classifier to said identified small sized face regions in said higher resolution version of said image.

2.   The method according to claim 1 comprising performing steps a) to c) on a first processor and performing steps d) and e) on a separate second processor.

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3.   The method of claim 1 wherein each of steps b) and c) include providing information including face size, face location, and an indication of a probability of said image including a face at or in the vicinity of said face region.

25 4.   The method of claim 3 further comprising generating a weighting based on said information.

5.   The method according to claim 3 comprising adjusting image acquisition parameters of a subsequent image in said image stream based on said information.

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6.   The method according to claim 5 wherein said adjusted image acquisition parameters include at least one of focus, exposure and white balance.

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7.   The method according to claim 5 wherein said subsequent image in said stream is a preview image.

8.   The method according to claim 5 wherein said subsequent image in said stream is a
5   main acquired image.

9.   The method according to claim 5 further comprising displaying said subsequent image to a user.

10 10.   The method according to claim 2 further comprising performing value added applications on said high resolution image on said separate second processor.

11.   A digital image acquisition apparatus comprising, a first processor operably connected to an imaging sensor, and a second processor operably connected to said first
15 processor, said first processor being arranged to provide an acquired image to said second processor and said second processor being arranged to store said image,
        said first processor being arranged to apply at least one high quality face classifier to a low resolution image of a scene from an image stream, said scene potentially including one or more faces, to identify large and medium sized face regions, and to apply at least one
20 relaxed face classifier relative to said high quality face classifier to said image to identify small sized face regions relative to said large and medium sized face regions; and
        said second processor being arranged to receive a high resolution image of nominally the same scene relative to said low resolution image and to apply at least one high quality face classifier relative to said relaxed face classifier to said identified small sized face
25 regions in said higher resolution version of said image.